

**Willem-Jan van Hoeve**

Carnegie Bosch Associate Professor of Operations Research  
Head, Master of Science in Business Analytics Program  
Tepper School of Business  
Carnegie Mellon University

July, 2018

**CURRICULUM VITAE****RESEARCH AND TEACHING INTERESTS**

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*Methodologies:* operations research, optimization, constraint programming, integer programming, hybrid solution methods, decision diagrams for optimization

*Applications:* vehicle routing, scheduling, network design, home care operations

**POSITIONS HELD**

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- 2018– Head, Master of Science in Business Analytics Program, Tepper School of Business, Carnegie Mellon University
- 2016– Carnegie Bosch Associate Professor of Operations Research, Tepper School of Business, Carnegie Mellon University
- 2013–16 Associate Professor of Operations Research, Tepper School of Business, Carnegie Mellon University
- 2013 Assistant Professor, Carnegie Mellon University in Qatar
- 2007–13 Assistant Professor of Operations Research, Tepper School of Business, Carnegie Mellon University
- 2005–07 Postdoctoral Associate, Department of Computer Science, Cornell University

**EDUCATION**

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- 2005 Ph.D., Computer Science, Faculty of Science, University of Amsterdam, and Centrum voor Wiskunde en Informatica (CWI), The Netherlands “*Operations Research Techniques in Constraint Programming*”
- 2000 M.Sc., Mathematical Programming, Department of Applied Mathematics, University of Twente, The Netherlands “*Towards the Integration of Constraint Logic Programming and Mathematical Programming*”

**CONSULTING PROJECTS**

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412 Food Rescue, AIMMS, Angel Flight, Bosch/Siemens, BP, Charter Steel, Crossett Inc., Family Hospice, Greater Pittsburgh Community Food Bank, Kalibrate, Labatt Food Service, PNC Bank, PolyChem, and others.

## **AWARDS, PRIZES, HONORS**

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George Leland Bach MBA Teaching Award (2011, 2017)

Carnegie Bosch Institute Faculty Research Chair (2016–)

Faculty Giving Chair (Academic Year 2011–2012)

BP Junior Faculty Chair (Academic Year 2008–2009)

Best paper award at the International Conference on Principles and Practice of Constraint Programming (CP) for “*Revisiting The Sequence Constraint*” (2006)

Best student paper award at the International Conference on Principles and Practice of Constraint Programming (CP) for “*A Hyper-Arc Consistency Algorithm for the Soft Alldifferent Constraint*” (2004)

## **EDITORIAL ROLES**

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### **Scientific/Professional Journals**

Editor, *Constraints* (2010–2016)

Editor, *Constraint Programming Letters* (2006–2008)

Guest Editor, *EURO Journal on Computational Optimization*, special issue on *Constraint Programming Approaches to Combinatorial Optimization* (2013–2014) and (2017–2018)

Guest Editor, *Constraints*, special issue on the Journal Fast Track for the conference CP (2016)

Ad Hoc Referee for *Operations Research*, *INFORMS Journal on Computing*, *Artificial Intelligence*, *Constraints*, *Journal of Artificial Intelligence Research*, *Journal of Computer and System Sciences*, *Mathematical Programming*, *Journal of Heuristics*, *Computers and Operations Research*, *International Journal of Planning and Scheduling*, *Operations Research Letters*, *Annals of Operations Research*, *Algorithms*, *Information Systems and Operational Research*, *Software: Practice and Experience*, *AI Communications*, *INFORMS Transactions on Education*, *Journal of Global Optimization*, *Natural Resource Modeling*, *International Transactions in Operational Research*, *Journal of Scheduling*, *AI Magazine*, *Theory and Practice of Logic Programming*, *European Journal of Operational Research*

### **Conference or program committee chair**

Area Chair, 33rd AAAI Conference on Artificial Intelligence (AAAI) (2019)

Chair, International Conference on Constraint Programming, Artificial Intelligence, and Operations Research (CPAIOR) (2009, 2018)

Co-chair, Dagstuhl Seminar on *Planning and Operations Research* (2018)

Chair, Journal Publication Fast Track of the International Conference on Principles and Practice of Constraint Programming (CP) (2016)

Chair, Constraint Programming Cluster of the International Symposium on Mathematical Programming (ISMP) (2012, 2015)

Chair, Tutorial and workshop program of the International Conference on Principles and Practice of Constraint Programming (CP) (2015)

Chair, Cluster *Computing Society/Constraint Programming and Integrated Methods* of the INFORMS Annual Meeting (2011)

Chair, Student Abstract and Poster Program for the National Conference on Artificial Intelligence (AAAI) (2008)

### **Conference or program committee member**

Member, Program committee of the International Conference on Principles and Practice of Constraint Programming (CP) (2007, 2012, 2014, 2017, 2018)

Member, Program committee of the International Conference on Constraint Programming, of Artificial Intelligence, and Operations Research (CPAIOR) (2007–2018)

Member, Program committee of the International Conference on Automated Planning and Scheduling (ICAPS) (2013, 2014, 2017)

Member, Senior program committee of the International Joint Conference on Artificial Intelligence (IJCAI) (2013, 2015, 2016)

Member, Senior program committee of the International Conference on Principles and Practice of Constraint Programming (CP) (2013, 2015, 2016)

Member, Program committee of the National Conference on Artificial Intelligence (AAAI) (2006–2008, 2010, 2012–2015)

Member, Program committee of the Application Track of the International Conference on Principles and Practice of Constraint Programming (CP) (2014)

Member, Program committee of the INFORMS Optimization Society Conference (2012)

Member, Program committee of the European Conference on Artificial Intelligence (ECAI) (2008, 2012)

Member, Program committee of the International Joint Conference on Artificial Intelligence (IJCAI) (2011)

### **COURSES TAUGHT (AT CARNEGIE MELLON)**

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Optimization (MBA core) (2008, 2009, 2014–2018)

Business Analytics Project (MBA capstone) (2011, 2012, 2014, 2015, 2018)

Operations Research Implementations (MBA elective) (2010–2014, 2016–2018)

Networks and Matchings (PhD) (2014)

Constraint Programming (PhD) (2010, 2013, 2016)

Mathematical Models for Consulting (undergraduate) (2008, CMUQ 2013)

Models and Methods for Optimization (undergraduate) (CMUQ 2013)

Applications of Operations Research (MBA elective) (2011, 2012)

Optimization Models for Operations (MBA elective) (2008–2011)

Optimization Models for Logistics (MBA elective) (2008)

Optimization, Logic & Constraint Satisfaction (PhD) (2007)

## RESEARCH GRANTS AND CONTRACTS

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### Awarded to date

Combinatorial Optimization: Algorithms and Applications

**Office of Naval Research**

March 2018 – February 2021

**Role:** Co-Principal Investigator (with Egon Balas and Gerard Cornuejols, Tepper School of Business)

Harnessing Intricate Substructures for Maximum Satisfiability

**Google Research Award**

January 2016

**Role:** Principal Investigator

An Analytical Approach to Evaluating Bank Branches

**PNC Center for Financial Services Innovation**

Spring 2014 (Educational Research Project)

Summer 2014 – Spring 2016 (Research Project)

**Role:** Co-Principal Investigator (with Alan Montgomery, Tepper School of Business)

Improved MDD-Based Optimization for Bin Packing Problems

**Google Research Award**

January 2012

**Role:** Principal Investigator

Multivalued Decision Diagrams in Optimization

**National Science Foundation**

September 2011 - August 2014

**Role:** Co-Principal Investigator (with John N. Hooker, Tepper School of Business)

Optimization for Food Rescue Programs

**Berkman Faculty Development Grant**

May 2010

**Role:** Principal Investigator

Computing and Visualizing Decision Impact in MS Dynamics

**Center for Business Solutions and Microsoft**

September 2008 - August 2009

**Role:** Co-Investigator

(with Stephen F. Smith, Robotics Institute, CMU)

Sourcing Strategy Development for Bosch/Siemens Home Appliances

**Carnegie-Bosch Institute and Bosch/Siemens Home Appliances**

September 2008 - August 2009

**Role:** Co-Investigator

(with Laurens Debo, Sham Kekre, and Sunder Kekre, Tepper School of Business)

### Articles in refereed journals (i.e., critical peer review before publication)

- C. Tjandraatmadja and W.-J. van Hoeve. Target Cuts from Relaxed Decision Diagrams. *INFORMS Journal on Computing*, to appear.
- J. N. Hooker and W.-J. van Hoeve. Constraint Programming and Operations Research. *Constraints* 23(2):172–195, 2018.
- J. Kinable, A. A. Cire, and W.-J. van Hoeve. Hybrid Optimization Methods for Time-Dependent Sequencing Problems. *European Journal of Operational Research* 259(3):887–897, 2017.
- J. Schuijbroek, R. Hampshire, and W.-J. van Hoeve. Inventory Rebalancing and Vehicle Routing in Bike Sharing Systems. *European Journal of Operational Research* 257(3):992–1004, 2017.
- D. Bergman, A. A. Cire, W.-J. van Hoeve, and J. N. Hooker. Discrete Optimization with Decision Diagrams. *INFORMS Journal of Computing* 28(1):47–66, 2016.
- D. Bergman, A. A. Cire, and W.-J. van Hoeve. Lagrangian Bounds from Decision Diagrams. *Constraints* 20(3): 346–361, 2015.
- V. Goel, M. Slusky, W.-J. van Hoeve, K. Furman, and Y. Shao. Constraint Programming for LNG Ship Scheduling and Inventory Management. *European Journal of Operational Research* 241(3): 662–673, 2015.
- D. Bergman, A. A. Cire, W.-J. van Hoeve, and J. N. Hooker. Optimization Bounds from Binary Decision Diagrams. *INFORMS Journal on Computing* 26(2): 253–258, 2014.
- D. Bergman, A. A. Cire, and W.-J. van Hoeve. MDD Propagation for Sequence Constraints. *Journal of Artificial Intelligence Research*, Volume 50, pp. 697–722, 2014.
- D. Bergman, A. A. Cire, W.-J. van Hoeve, and T. Yunes. BDD-Based Heuristics for Binary Optimization. *Journal of Heuristics* 20(2): 211–234, 2014.
- A. A. Cire and W.-J. van Hoeve. Multivalued Decision Diagrams for Sequencing Problems. *Operations Research* 61(6): 1411–1428, 2013.
- P. Benchimol, W.-J. van Hoeve, J.-C. Régin, L.-M. Rousseau, and M. Rueher. Improved Filtering for Weighted Circuit Constraints. *Constraints* 17(3): 205–233, 2012.
- J. Conrad, C.P. Gomes, W.-J. van Hoeve, A. Sabharwal, and J.F. Suter. Wildlife corridors as a connected subgraph problem. *Journal of Environmental Economics and Management* 63(1): 1–18, 2012.
- W.-J. van Hoeve, G. Pesant, L.-M. Rousseau, and A. Sabharwal. New Filtering Algorithms for Combinations of Among Constraints. *Constraints* 14(2): 273–292, 2009.
- W.-J. van Hoeve, G. Pesant, and L.-M. Rousseau. On Global Warming: Flow-Based Soft Global Constraints. *Journal of Heuristics* 12(4–5): 347–373, 2006.
- W.-J. van Hoeve. Exploiting Semidefinite Relaxations in Constraint Programming. *Computers & Operations Research* 33(10): 2787–2804, 2006.

## Articles in refereed conference proceedings

- W.-J. van Hoeve and S. Tayur. Integer and Constraint Programming for Batch Annealing Process Planning. In *Proceedings of CP*,<sup>1</sup> volume 10416 of LNCS,<sup>2</sup> pp. 431–439. Springer, 2017.
- K. A. Giles and W.-J. van Hoeve. Solving a Supply-Delivery Scheduling Problem with Constraint Programming. In *Proceedings of CP*, volume 9892 of LNCS, pp. 602–617. Springer, 2016.
- J. Kinable, W.-J. van Hoeve, and S. F. Smith. Optimization Models for a Real-World Snow Plow Routing Problem. In *Proceedings of CPAIOR*,<sup>3</sup> volume 9676 of LNCS, pp. 229–245. Springer, 2016.
- D. Bergman, A. A. Cire, and W.-J. van Hoeve. Improved Constraint Propagation via Lagrangian Decomposition. In *Proceedings of CP*, volume 9255 of LNCS, pp. 30–38. Springer, 2015.
- B. Kell, A. Sabharwal, and W.-J. van Hoeve. BDD-Guided Clause Generation. In *Proceedings of CPAIOR*, volume 9075 of LNCS, pp. 215–230. Springer, 2015.
- D. Bergman, A. A. Cire, A. Sabharwal, H. Samulowitz, V. Saraswat, and W.-J. van Hoeve. Parallel Combinatorial Optimization with Decision Diagrams. In *Proceedings of CPAIOR*, volume 8451 of LNCS, pp. 351–367. Springer, 2014.
- B. Kell and W.-J. van Hoeve. An MDD Approach to Multidimensional Bin Packing. In *Proceedings of CPAIOR*, volume 7874 of LNCS, pp. 128–143. Springer, 2013.
- M. R. Slusky and W.-J. van Hoeve. A Lagrangian Relaxation for Golomb Rulers. In *Proceedings of CPAIOR*, volume 7874 of LNCS, pp. 251–267. Springer, 2013.
- A. A. Cire and W.-J. van Hoeve. MDD Propagation for Disjunctive Scheduling. In *Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS)*, pp. 11–19. AAAI Press, 2012.
- A. A. Cire, E. Coban, and W.-J. van Hoeve. Flow-Based Combinatorial Chance Constraints. In *Proceedings of CPAIOR*, volume 7298 of LNCS, pp. 129–145. Springer, 2012.
- D. Bergman, A. A. Cire, W.-J. van Hoeve, and J. N. Hooker. Variable Ordering for the Application of BDDs to the Maximum Independent Set Problem. In *Proceedings of CPAIOR*, volume 7298 of LNCS, pp. 34–49. Springer, 2012.
- R. Steiger, W.-J. van Hoeve, and R. Szymanek. An Efficient Generic Network Flow Constraint. In *Proceedings of the ACM Symposium on Applied Computing (SAC)*, pp. 893–900. ACM, 2011.
- D. Bergman, W.-J. van Hoeve, and J. N. Hooker. Manipulating MDD Relaxations for Combinatorial Optimization. In *Proceedings of CPAIOR*, volume 6697 of LNCS, pp. 20–35. Springer, 2011.
- S. Hoda, W.-J. van Hoeve, and J. N. Hooker. A Systematic Approach to MDD-Based Constraint Programming. In *Proceedings of CP*, volume 6308 of LNCS, pp. 266–280. Springer, 2010.
- P. Benchimol, J.-C. Régin, L.-M. Rousseau, M. Rueher, and W.-J. van Hoeve. Improving the Held and Karp Approach with Constraint Programming. In *Proceedings of CPAIOR*, volume 6140 of LNCS, pp. 40–44. Springer, 2010.
- J.-C. Régin, L.-M. Rousseau, M. Rueher, and W.-J. van Hoeve. The Weighted Spanning Tree Constraint Revisited. In *Proceedings of CPAIOR*, volume 6140 of LNCS, pp. 176–180. Springer, 2010.

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<sup>1</sup> CP: The International Conference on Principles and Practice of Constraint Programming

<sup>2</sup> LNCS: Lecture Notes in Computer Science

<sup>3</sup> CPAIOR: The International Conference on Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems

- C. Gunes, W.-J. van Hoeve, and S. Tayur. Vehicle Routing for Food Rescue Programs: A Comparison of Different Approaches. In *Proceedings of CPAIOR*, volume 6140 of *LNCS*, pp. 287–291. Springer, 2010.
- Y. Malitsky, M. Sellmann, and W.-J. van Hoeve. Length-Lex Bounds Consistency for Knapsack Constraints. In *Proceedings of CP*, volume 5202 of *LNCS*, pp. 266–281. Springer, 2008.
- C. P. Gomes, W.-J. van Hoeve, and A. Sabharwal. Connections in Networks: A Hybrid Approach. In *Proceedings of CPAIOR*, volume 5015 of *Lecture Notes in Computer Science*, pp. 303–307. Springer, 2008.
- W.-J. van Hoeve and A. Sabharwal. Filtering Atmost1 on Pairs of Set Variables. In *Proceedings of CPAIOR*, volume 5015 of *Lecture Notes in Computer Science*, pp. 382–386. Springer, 2008.
- C. P. Gomes, W.-J. van Hoeve, A. Sabharwal, and B. Selman. Counting CSP Solutions Using Generalized XOR Constraints. In *Proceedings of the AAI Conference on Artificial Intelligence (AAAI)*, pp. 204–209. AAAI Press, 2007.
- W.-J. van Hoeve, C. P. Gomes, M. Lombardi, and B. Selman. Optimal Multi-Agent Scheduling with Constraint Programming. In *Proceedings of the AAI Conference on Innovative Applications of Artificial Intelligence (IAAI)*, pp. 1813–1818. AAAI Press, 2007.
- J. Conrad, C. P. Gomes, W.-J. van Hoeve, A. Sabharwal, and J. Suter. Connections in Networks: Hardness of Feasibility versus Optimality. In *Proceedings of CPAIOR*, volume 4510 of *LNCS*, pp. 16–28. Springer, 2007.
- W.-J. van Hoeve, G. Pesant, L.-M. Rousseau, and A. Sabharwal. Revisiting the Sequence Constraint. In *Proceedings of CP*, volume 4204 of *LNCS*, pp. 620–634. Springer, 2006.
- W.-J. van Hoeve and J.-C. Régin. Open Constraints in a Closed World. In *Proceedings of CPAIOR*, volume 3990 of *LNCS*, pp. 244–257. Springer, 2006.
- C. P. Gomes, W.-J. van Hoeve, and L. Leahu. The Power of Semidefinite Programming Relaxations for MAX-SAT. In *Proceedings of CPAIOR*, volume 3990 of *LNCS*, pp. 104–118. Springer, 2006.
- W.-J. van Hoeve. A Hyper-Arc Consistency Algorithm for the Soft Alldifferent Constraint. In *Proceedings of CP*, volume 3258 of *LNCS*, pp. 679–689. Springer, 2004.
- W.-J. van Hoeve and M. Milano. Postponing Branching Decisions. In *Proceedings of the European Conference on Artificial Intelligence (ECAI)*, pp. 1105–1106. IOS Press, 2004.
- W.-J. van Hoeve. A Hybrid Constraint Programming and Semidefinite Programming Approach for the Stable Set Problem. In *Proceedings of CP*, volume 2833 of *LNCS*, pp. 407–421. Springer, 2003.
- M. Milano and W.-J. van Hoeve. Reduced Cost-Based Ranking for Generating Promising Subproblems. In *Proceedings of CP*, volume 2470 of *LNCS*, pp. 1–16. Springer, 2002.

#### **Articles in edited books/volumes**

- N. Lahrichi, L.-M. Rousseau, and W.-J. van Hoeve. Residential Care (invited chapter). In T. Dai and S. Tayur (eds.), *Handbook of Health Care Analytics*, pp. 257–285. Wiley, 2018.
- W.-J. van Hoeve. Semidefinite Programming and Constraint Programming (invited chapter). In M. F. Anjos and J. B. Lasserre (eds.), *Handbook of Semidefinite, Cone and Polynomial Optimization: Theory, Algorithms, Software and Applications*, pp. 635–668. Springer, 2012.
- W.-J. van Hoeve. Over-Constrained Problems (invited chapter). In P. Van Hentenryck and M. Milano (eds.), *Hybrid Optimization: the 10 years of CPAIOR*, pp. 191–225. Springer, 2011.

W.-J. van Hoeve and I. Katriel. Global Constraints (invited chapter). In F. Rossi, P. van Beek, and T. Walsh (eds.), *Handbook of Constraint Programming*, pp. 169–208. Elsevier, 2006.

### **Books/volumes**

W.-J. van Hoeve (ed.). Integration of Constraint Programming, Artificial Intelligence, and Operations Research - 15th International Conference, CPAIOR 2018, Delft, The Netherlands, June 26-29, 2018, Proceedings. *Lecture Notes in Computer Science* 10848, Springer 2018.

D. Bergman, A. A. Cire, W.-J. van Hoeve, and J. N. Hooker. Decision Diagrams for Optimization. Springer, 2016.

W.-J. van Hoeve and J.N. Hooker (eds.). Proceedings of the International Conference on Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems (CPAIOR), volume 5547 of *Lecture Notes in Computer Science*, Springer, 2009.

W.-J. van Hoeve. Operations Research Techniques in Constraint Programming. *ILLC Dissertation Series* DS 2005-02. ILLC, 2005. ISBN 9061965292.

### **Articles in refereed but non-archived proceedings**

W.-J. van Hoeve, M. Hunting, and C. Kuip. The Aimms Interface to Constraint Programming. In *Proceedings of Late Breaking Abstracts of CPAIOR*, ZIB Report 11-20, pp. 41–43, 2011.

W.-J. van Hoeve and A. Sabharwal. Two Set-Constraints for Modeling and Efficiency. In *Proceedings of the 6th International Workshop on Constraint Modelling and Reformulation (ModRef)*, 2007.

C.P. Gomes, W.-J. van Hoeve, and B. Selman. Constraint Programming for Distributed Planning and Scheduling. In *Proceedings of the AAAI 2006 Spring Symposium on Distributed Plan and Schedule Management*, AAAI Press, 2006.

W.-J. van Hoeve, G. Pesant, and L.-M. Rousseau. On Global Warming (Softening Global Constraints). In *Proceedings of the International Workshop on Preferences and Soft Constraints*, 2004.

W.-J. van Hoeve. The Alldifferent Constraint: A Survey. In *Proceedings of the Annual Workshop of the ERCIM Working Group on Constraints*, 2001.

## **NON-PUBLISHED PAPERS**

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### **Completed Working Papers**

D. Davarnia and W.-J. van Hoeve. Outer Approximation for Integer Nonlinear Programs via Decision Diagrams. *Under review*.

A. Hosseininasab and W.-J. van Hoeve. Exact Multiple Sequence Alignment by Synchronized Decision Diagrams. *Under review (INFORMS Journal on Computing)*.

B. K. Peterson, W.-J. van Hoeve, L. G. Debo, and S. Kekre. Flexible Milk-Runs for Stochastic Vehicle Routing. Tepper School of Business Working Paper 2010-E78, Carnegie Mellon University, 2010. 23 pages.

G. Dooms, L. Mercier, P. Van Hentenryck, W.-J. van Hoeve and L. Michel. Length-Lex Open Constraints. Technical Report CS-07-09, Brown University, 2007.

W.-J. van Hoeve and M. Milano. Decomposition Based Search – A theoretical and experimental evaluation. Technical Report LIA00203, University of Bologna, 2003.



### Master's Student Supervision

Claire Souchet Jacquillat (Tepper MBA), Independent Study 45-997, "Network Structure Design for Optimally Facilitating Traceability" (Spring, 2017)

Katherine Giles (Tepper MBA), Project course 45-998, "Solving a Supply-Delivery Scheduling Problem Using Constraint Programming" (Spring, 2015)

Steven Hollander and Jesse Lambert (Tepper MBA), Project course 45-998, "Sports Analytics Independent Study" (Spring, 2014)

Sidhartha Mani (School of Computer Science), Research Project, "Constraint Propagation for the Traveling Tournament Problem" (Fall, 2013)

Daniel Wiesenfeld (Tepper MBA), Project course 45-958, "Nurse Scheduling Using Constraint Programming" (Fall, 2012)

Jasper Schuijbroek, Visiting student (Eindhoven University of Technology), Research Project, "Combined Inventory Planning and Vehicle Routing" (Fall, 2012)

Andrea Foncerrada and Gabriela Luongo (Heinz College), Systems Project, "Food Collection Vehicle Routing for Mexico City Food Bank" (Fall, 2012)

Casey Johnson (Tepper MBA), Independent study 45-997, "Inventory Reallocation and Optimal Routing" (2010)

Sumit Mitra, Visiting student (RWTH Aachen University), Master's Thesis, "Hybrid Methods for Mixed-Integer Nonlinear Programming Problems" (2009)

Markus Völker, Visiting student (University of Karlsruhe), joint with R. Ravi, Master's Thesis, "Scheduling and Topology Control in Wireless Sensor Networks" (2008)

### Doctoral Student Supervision – Thesis Committee Chair

Amin Hosseinasab (Chair, Thesis Committee) (Tepper School of Business)

Ryo Kimura (Chair, Thesis Committee) (Tepper School of Business)

Christian Tjandraatmadja (Chair, Thesis Committee) (Tepper School of Business) (2018, expected)  
Honorable mention **MIP 2015 Poster Prize** for "Polar Cuts from Relaxed Decision Diagrams"

Brian Kell (Chair, Thesis Committee) (Mathematical Sciences, CMU)  
(Thesis Title: Decision Diagrams for Combinatorial Optimization and Satisfaction) (2015)

Marla Slusky (Chair, Thesis Committee) (Mathematical Sciences, CMU)  
(Thesis Title: Integrating Relaxations for Combinatorial Optimization) (2015)

Andre Cire (Co-chair, Thesis Committee) (Tepper School of Business, CMU)  
(Thesis Title: Decision Diagrams for Optimization) (2014)

Recipient of the 2014 **INFORMS Computing Society Student Paper Award** for "Multi-Valued Decision Diagrams for Sequencing Problems"

Recipient of the 2016 **Doctoral Research Award** of the Association for Constraint Programming

David Bergman (Co-chair, Thesis Committee) (Tepper School of Business, CMU)  
(Thesis Title: New Techniques for Discrete Optimization) (2013)  
Recipient of the 2014 **Doctoral Research Award** of the Association for Constraint Programming

### Doctoral Student Supervision – Other

Ziye Tang (Summer Paper Research Project) (Tepper School of Business) (2018)

Sagnik Das (Summer Paper Reader) (Tepper School of Business) (2018)

Thomas Lavastida (Summer Paper Reader) (Tepper School of Business) (2018)

Jayanth Krishna Mogali (Member, Qualifier Committee) (Robotics Institute, CMU) (2018)

Anirudh Subramanyam (Member, Thesis Committee) (Chemical Engineering, CMU)  
(Thesis Proposal Title: Robust Optimization of Vehicle Routing Problems Under Uncertainty)

Guillaume Perez (External Examiner, Thesis Committee) (University of Nice, France) (Thesis Title:  
Decision Diagrams: Constraints and Algorithms) (2017)

Sagnik Das (Summer Research Project) (Tepper School of Business) (2017)

Francisco Cisternas-Vera (Member, Thesis Committee) (Tepper School of Business, CMU) (Thesis  
Title: The impact of new technologies on firm-consumer relationships) (2017)

Nicholas Downing (External Examiner, Thesis Committee) (University of Melbourne, Australia)  
(Thesis Title: Scheduling and Rostering with Learning Constraint Solvers) (2017)

Yash Puranik (Member, Thesis Committee) (Chemical Engineering, CMU)  
(Thesis Title: Bounds Tightening Techniques for Global Optimization of MINLPs) (2016)

Elvin Coban (Member, Thesis Committee) (Tepper School of Business, CMU)  
(Thesis Title: Deterministic and Stochastic Models for Practical Scheduling Problems) (2012)

Shweta Shah (Member, Thesis Committee) (Chemical Engineering, CMU)  
(Thesis Title: Optimization Models and Strategies for Protein Structure Alignment) (2011)

Canan Gunes (Member, Thesis Committee) (Tepper School of Business, CMU)  
(Thesis Title: Essays on Operations Management) (2010)

Sylvain Mouret (Member, Thesis Committee) (Chemical Engineering, CMU)  
(Thesis Title: Optimal Scheduling of Refinery Crude-Oil Operations) (2010)

Samid Hoda (Member, Thesis Committee) (Tepper School of Business, CMU)  
(Thesis Title: Essays on equilibrium computation, MDD-based constraint programming and  
scheduling) (2010)

Benjamin K. Peterson (Member, Thesis Committee) (Tepper School of Business, CMU)  
(Thesis Title: Transportation Scheduling Methods) (2010)

Erkut Sonmez (Member, Thesis Committee) (Tepper School of Business, CMU)  
(Thesis Title: Capacity Management with Technology Considerations) (2009)

### Plenary talks/tutorials at Conference/Symposium

Invited Tutorial, "Decision diagrams for Discrete Optimization, Constraint programming, and Integer Programming", **Master Class on Hybrid Methods for Combinatorial/Mixed Optimization**, Toulouse, France (2018)

Tutorial,<sup>4</sup> "Decision Diagrams for Sequencing and Scheduling", **International Conference on Automated Planning and Scheduling (ICAPS)** (2016)

Invited Tutorial, "Lagrangian Relaxation in Constraint Programming", **Master Class of the International Conference CPAIOR** (2016)

Invited Tutorial, "Decision Diagram-Based Constraint Programming", **ACP Summer School on Constraint Programming** (2015)

Keynote Presentation, "Decision Diagrams for Optimization and Scheduling", **Workshop on Models and Algorithms for Planning and Scheduling Problems (MAPSP)** (2015)

Invited Tutorial, "Global Constraints" and "Hybrid Constraint and Integer Programming", **ACP Summer School on Constraint Programming** (2014)

Invited Tutorial, "Decision Diagrams for Discrete Optimization", **Montreal Optimization Days** (2014)

Invited Tutorial, "Decision Diagrams for Discrete Optimization", **Tutorial Forum of the AAAI Conference on Artificial Intelligence** (2013)

Invited Plenary Tutorial, "Constraint Programming with Decision Diagrams", **International Conference on Principles and Practice of Constraint Programming (CP)** (2012)

Invited Tutorial, "Operations Research Techniques in Constraint Programming", **ACP Summer School on Constraint Programming** (2012)

Invited Presentation, "Decision Diagrams for Discrete Optimization", **Mixed Integer Programming (MIP) Workshop Series** (2011)

Invited Tutorial, "Global Constraints in Constraint Programming", **Montreal Optimization Days** (2010)

Tutorial, "Soft Global Constraints", **International Conference on Principles and Practice of Constraint Programming (CP)** (2009) – Accepted through proposal/selection procedure

Invited Tutorial, "Soft Global Constraints", **ACP Summer School on Constraint Programming** (2006)

### Panel discussions at Conference/Symposium

Decision Diagrams in Constraint Programming: **CP Workshop on Constraint Modelling and Reformulation (ModRef)** (2011) (Panel on the future of CP modeling and solving)

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<sup>4</sup> This tutorial program follows a review/selection procedure.

## EXTERNAL SERVICE

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Chair, INFORMS Student Competition Committee (2018–2019)

Member, INFORMS Student Competition Committee (2017–2018)

Member, Steering Committee of CPAIOR conference series (2015–)

Elected Member, Executive Committee of the Association for Constraint Programming (ACP)  
(2013–2016, office of secretary)